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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/888,701	06/25/2001	Glenn A. Woodell	VBSTC12a	8722

7590 03/26/2004

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EXAMINER	
CHAWAN, SHEELA C	

ART UNIT	PAPER NUMBER
2625	3

DATE MAILED: 03/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/888,701	WOODELL ET AL.	
	Examiner	Art Unit	
	Sheela C Chawan	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 June 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Drawings filed on 6/25/01have been approved by the Examiner.

Claim Rejections - 35 U.S.C. § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Rahman et al. (US.5, 991,456, Listed in IDS paper # 2).

As to claim 1, Rahman discloses a method of processing a digital image, comprising the steps of (column 7, lines 58- 59):

providing digital data indexed to represent positions of an image having S spectral bands for simultaneous output on a display, said digital data being indicative of an intensity value $I_i(x, y)$ for each position (x, y) in each i-th spectral band (column 7, lines 60- 63);

defining a classification of said image based on dynamic range of said image in each of said S spectral bands (column 4, lines 19-60);

adjusting said intensity value for said each position in each i-th spectral band to generate an adjusted intensity value for said each position in each i-th spectral band in accordance with

$$\sum_{n=1}^{N} W_n\{\log I_i(x, y) - \log[I_i(x, y) * F_n(x, y)]\},\ i = 1, \ldots, S$$

where S is the number of unique spectral bands included in said digital data and, for each n, W_n is a weighting factor and $F_n(x, y)$ is a unique surround function applied to said each position (x, y) and N is the total number of unique surround functions (column 8, lines 7-10); and

filtering said adjusted intensity value for said each position of said image in each of said S spectral bands using a filter function based on said classification of said image wherein a filtered intensity value $R_i(x, y)$ is defined (column 4, lines 19-60, column 8, lines 11-13).

As to claim 2, Rahman discloses a method wherein each said unique surround function is a Gaussian function (column 8, lines 18-19).

As to claim 3, Rahman discloses a method wherein said Gaussian function is of the form

$$e^{\frac{-r^2}{c_n^2}}$$

satisfying the relationship (column 8, lines 20-40)

$$k_n \int\int e^{\frac{-r^2}{c_n^2}} dx dy = 1$$

where

$$r = \sqrt{x^2 + y^2}$$

and, for each n, k_n is a normalization constant and c_n is a unique constant for each of said N unique surround functions.

As to claims 4 and 16, Rahman discloses a method further comprising the step of multiplying said filtered intensity value $R_i(x, y)$ by

$$\log\left[\frac{BI_i(x, y)}{\sum_{i=1}^{S} I_i(x, y)}\right]$$

to define a color-restored intensity value $R'_i(x, y)$, where B is a constant (column 8, lines 41-51).

As to claim 5, Rahman discloses a method wherein said each position (x, y) defines a pixel of said display (column 8, lines 53- 54).

As to claims 6 and 22, Rahman discloses a method wherein, for each n, W,=1/N (column 8, lines 54-55).

As to claims 7,17 and 24, Rahman discloses a method wherein said step of defining comprises the step of using image statistics associated with said image in each of said S spectral bands to select said filter function (column 4, lines 61 to column 5 line 5, column 6, lines 1-21).

As to claims 8, 18 and 25, Rahman discloses a method wherein said image statistics include brightness and contrast of said image in each of said S spectral bands(column 2, lines 55-64, column 4, lines 19-37).

As to claims 9 and 19 Rahman discloses a method further comprising the steps of:

selecting a maximum intensity value $V_i(x, y)$ from the group consisting of said intensity value $I_i(x, y)$ and said filtered intensity value $R_I(x, y)$ (column 4, line 6 to col umn 5, line 5); and

displaying an improved image using said maximum intensity value Vj (x, y) (column 2, line 60 to column 3, line 20).

As to claims 10, 20 and 26, Rahman discloses a method comprising the steps of:

selecting a maximum intensity value V,(x, y) from the group consisting of said intensity value I_1(x , y) and said color-restored intensity value R',(x, y) (column 4, line 6 to column 5, line 5); and

displaying an improved image using said maximum intensity value V,(x, y) (column 2, line 60 to column 3, line 20).

As to claim 11, Rahman discloses a method of processing a digital image, comprising the steps of (column 7, lines 58- 59):

providing digital data indexed to represent the position of a plurality of pixels of a J-row by K-column display, said digital data being indicative of an intensity value I (x, y) for each of said plurality of pixels where x is an index of a position in the J-th row of said display and y is an index of a position in the K-th column of said display wherein a JxK image is defined (column 7, lines 60-63);

convolving said digital data associated with each of said plurality of pixels with function (claim 7, column 8, lines 66- 67, column 9, lines 1- 4);

$$e^{\frac{-r^2}{2\sigma^2}}$$

to form a discrete convolution value for each of said plurality of pixels, said function satisfying the relationship (column 9, lines 6-12)

$$k_n \int\int e^{\frac{-r^2}{c^2}} dx dy = 1$$

where

$$r = \sqrt{x^2 + y^2}$$

K is a normalization constant and c is a constant (column 9, lines 14-18);

converting, for each of said plurality of pixels, said discrete convolution value into the logarithm domain (column 9, lines 20- 21);

converting, for each of said plurality of pixels, said intensity value into the logarithm domain (column 9, lines 23- 24);

subtracting, for each of said plurality of pixels, said discrete convolution value so-converted into the logarithm domain from said intensity value so-converted into the logarithm domain, wherein an adjusted intensity value is generated for each of said plurality of pixels (column 9, lines 25- 31); and

filtering said adjusted intensity value for each of said plurality of pixels with a filter function that is based on dynamic range of said JxK image wherein a filtered intensity value R (x, y) is defined (column 9, lines 25- 30).

As to claims 12, 15 and 23 Rahman discloses a method wherein the value of said constant c is selected to be in the range of approximately 0.01 to approximately 0.5 of the larger of J and K (column 9, lines 38- 40).

As to claim 14, Rahman discloses a method of processing a digital image, comprising the steps of:

providing digital data indexed to represent the positions of a plurality of pixels of an J-row by K-column display, said digital data being indicative of an intensity value Ii(x, y) for each i-th spectral band of S spectral bands for each of said plurality of pixels where x is an index of a position in the J-th row of said display and y is an index of a position in the K-th column of said display wherein a (JxK), image is defined for each of said S spectral bands and a JxK image is defined across all of said S spectral bands (column 9, lines 44- 50);

defining a classification of said JxK image based on dynamic range of each said $(JxK)_i$ (column 4, lines 19-60);

convolving said digital data associated with each of said plurality of pixels in each i-th spectral band with a function for n = 2 to N to form N convolution values for each of said plurality of pixels in each said i-th spectral band, said function satisfying the relationship

$$k_n \int\int e^{\frac{-r^2}{c_n^2}} dx dy = 1$$

where

$$r = \sqrt{x^2 + y^2}$$

and, for each n, k_n is a normalization constant and c_n, is a unique constant (column 9, lines 51-65, column 10, lines 1- 7);

converting, for each of said plurality of pixels in each said i-th spectral band, each of said N convolution values into the logarithm domain (column 10, lines 9-11);

converting, for each of said plurality of pixels in each said i-th spectral band, said intensity value into the logarithm domain (column 10, lines 12-14);

subtracting, for each of said plurality of pixels in each said i-th spectral band, each of said N convolution values so converted into the logarithm domain from said intensity value so-converted into the logarithm domain, wherein an adjusted intensity value is generated for each of said plurality of pixels in each said i-th spectral band based on each of said N convolution values (column 10, lines 15- 21);

forming a weighted sum for each of said plurality of pixels in each said i-th spectral band using said adjusted intensity values (column 10, lines 22- 24); and filtering said weighted sum for each of said plurality of pixels in each said i-th spectral band with a filter function that is based on said classification of said JxK image wherein a filtered intensity value R_i (x, y) is defined (column 4, lines 19-60, column 8, lines 11-13 column 10, lines 25- 28).

As to claim 21, discloses a method of processing a digital image, comprising the steps of (column 10, lines 49- 54):

providing digital data indexed to represent positions of an image having S spectral bands for simultaneous output on a display, said digital data being indicative of an intensity value I_i (x, y) for each position (x, y) in each i-th spectral band (column 10, lines 51- 54);

defining a classification of said image based on dynamic range of said image in each of said S spectral bands (column 4, lines 19-60);

adjusting said intensity value for said each position in each i-th spectral band to generate an adjusted intensity value for said each position in each i-th spectral band in accordance with

$$\sum_{n=1}^{N} W_n(\log I_i(x, y) - \log[I_i(x, y) * F_n(x, y)]), i = 1, \ldots, S$$

where S is a whole number greater than or equal to 2 and defines the total number of spectral bands included in said digital data and, for each n, W_n is a weighting factor and $F_n(x, y)$ is a unique surround function of the form (column 10, lines 56-67)

$$e^{\frac{-r^2}{c_n^2}}$$

satisfying the relationship (column 11, lines 1-10)

$$k_n \int\int e^{\frac{-r^2}{c_n^2}} dx dy = 1$$

where (column 11, lines 10-15)

$$r = \sqrt{x^2 + y^2}$$

and, for each n, k_n is a normalization constant and c_n is a unique constant where N is the total number of unique surround functions (column 11, lines 16-22);

filtering said adjusted intensity value for said each position in each i-th spectral band with a function based on said classification of said image wherein a filtered intensity value $R_i(x, y)$ is defined; and

multiplying said filtered intensity value $R'_i(x, y)$ by

$$\log\left[\frac{BI_i(x, y)}{\sum_{i=1}^{s} I_i(x, y)}\right]$$

to define a color-restored intensity value R'_i (x, y), where B is a constant (column 12, lines 5- 12).

Other prior art cited

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yang (US.6,160,617) discloses high resolution imaging microscope (hirim(and uses thereof.

Cabib et al.(US.6,690,817 B1) discloses spectral bio-imaging data for cell classification using internal reference.

Cabib et al.(US.5,991,028) discloses spectral bio-imaging methods for cell classification.

Yang (US.5,859,700) discloses hogh resolution imaging microscope (hirim) and uses thereof.

Contact Information

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheela C Chawan whose telephone number is 703-305- 4876. The examiner can normally be reached on Monday - Thursday 6 - 7.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 703-308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

scc

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March 16, 2004

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